

University of Ruhuna- Faculty of Technology

Bachelor of Engineering Technology

Level 3 (Semester 1) Examination, July 2020

Course Unit: ENT3142 – Circuit Analysis & Fault Diagnosis

Time Allowed: 2 hours

General instructions

1. Read all instructions carefully before answering the questions.
2. This question paper consists of **five** questions.
3. Answer **all** questions.
4. All questions carry equal marks.
5. Always start a new question from a new page.
6. Present necessary, but relevant facts and information briefly. Any missing information can be sensible and reasonably assumed, provided that you state them clearly.

Q1.

- a. Explain the term “DC Bias Point analysis”. (3 Marks)
- b. List the assumptions used when calculating the DC Bias point. (4 Marks)
- c. Briefly describe the Kirchoff laws of electric circuits. (4 Marks)
- d. Determine the voltage across the R1 resistor and current through R8 resistors shown in figure 1. (12 Marks)

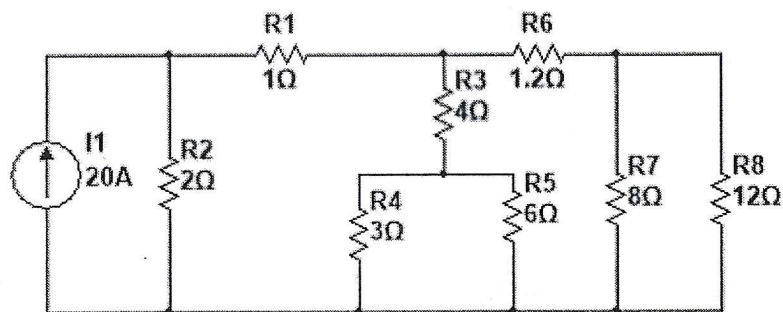


Figure 1

Q2.

- Briefly describe the transient analysis of an electronic circuit. (5 Marks)
- Derive an expression to show complete response of an RC Circuit. (12 Marks)
- The switch in Figure.2 has been in position “a” for a long time. As it moves to position “b” ($t=0$). Calculate $V(t)$ for all $t \geq 0$. (10 Marks)

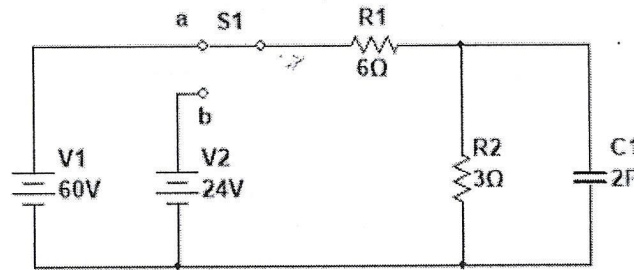


Figure 2

Q3.

- Briefly describe the “Frequency domain analysis” of an electronic circuit. (3 Marks)
- List down the advantages of Frequency domain analysis over time-domain analysis. (4 Marks)
- What is the frequency response of the electronic circuit? (3 Marks)
- Derive the transfer function of the RC circuit shown in figure 3, assuming $V_s = V_m \cos(\omega t)$. V_o - Voltage across capacitor (7 Marks)

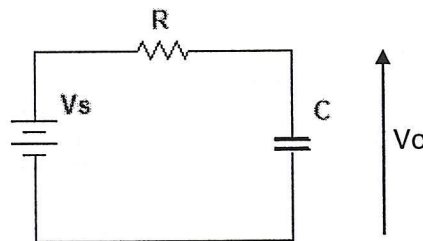


Figure 3

- Hence obtain the following expressions.
 - Magnitude of the transfer function. (4 Marks)
 - Phase of the transfer function. (4 Marks)

Q4.

a. What is the common type of faults occurring in the following components? (4 Marks)

- i. Resistors
- ii. Capacitors
- iii. Inductors
- iv. Semiconductor Devices

b. Single-stage class A transistor amplifier is shown in figure 4.

- i. Calculate the voltages at test Point 1,2 and 3. (9 Marks)
- ii. Table 1 shows the test point voltages under faulty condition. Determine the faulty component/s by giving reasons. (12 Marks)

Table 1

Case	TP1	TP2	TP3	Output
A	0	12	0	No output signal
B	2.4	12	1.7	No output signal
C	0.75	0.1	0.1	No output signal

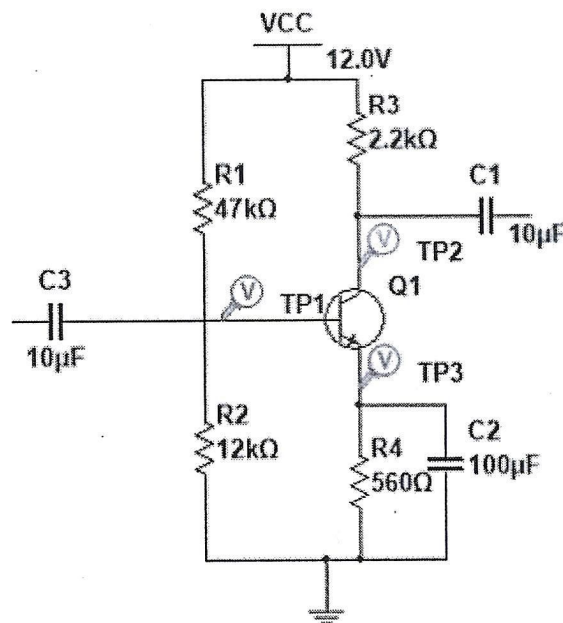


Figure 4

Q5.

- a. Briefly describe the following fault-finding techniques using appropriate diagrams. (9 Marks)
- i. Divergence Path
 - ii. Convergence Path
 - iii. Feedback Path
- b. Briefly explain the two types of stresses Occurring in the electronic circuits. (6 Marks)
- c. Explain the term “Absolute maximum rating” of a component. (4 Marks)
- d. List six environmental parameters which need to consider when we are buying electronic components. (6 Marks)